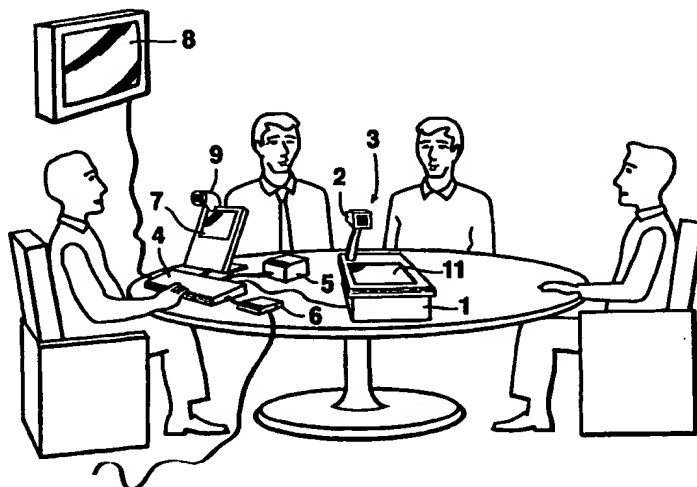


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(54) Title: VIDEO CONFERENCE EQUIPMENT



## (57) Abstract

The invention relates to video conference equipment comprising a document presentation worktop (11), a camera (2) arranged above the document presentation worktop (11), actuators (3) such as electric motors for the camera (2), control means (4) for the actuators (3), for example a computer, audio equipment (5) for saving and producing sound, a telecommunication module (6) for forwarding audio, data, and/or video information, and a display unit (8) for displaying material filmed using the camera (2). According to the invention, the camera is of a kind allowing both vertical and horizontal shooting, a personal display unit (7, 7') and camera (9) are reserved for at least one conference participant, whereby the conference can be arranged in the manner of a normal conference as regards the seating of the participants. In addition, according to the invention the telecommunication module (6) of the video conference equipment allows a data channel or a TCP/IP data channel or a corresponding data channel and the transmission of the MIDI signal of musical instruments as well as of signals controlling the pitch, intensity, duration, and manner of presentation of music synchronized with video images during a video conference connection.

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## Video conference equipment

The present invention relates to video conference equipment according to the preamble of claim 1.

The term video conference refers to interactive communication via telecommunication networks by means of moving pictures and sound in compliance with internationally set standards (ITU H.320). In addition, the various facilities enabling the transmission of information during a video conference connection - transmission of files, joint use of electronic notice boards and different applications - have been agreed upon by means of a separate standard (ITU T.120). That the transmitted information remain unchanged (e.g., stills used as samples) and that it be saveable for later inspection are special requirements imposed on video conference equipment within telemedicine.

A switched digital network (ISDN) has, particularly because of its switched nature and attractive cost become the most commonly used video conference transmission path. Within telemedicine, three simultaneous ISDN connections (384 kB) have been found to produce sufficient picture quality for certain medical applications, a few of which will be cited below. With the progress of standardization, a broadband ATM network, TCP/IP based data networks and networks for analog data transmission (GSM and an ordinary telephone network) are becoming increasingly common as other transmission paths.

The video conference systems of the 80's were large assemblies consisting of several different units immovably set up in so called video conference studios. For communication, a fixed 2 MB-band network reserved for video conferences was used. The cost of the equipment as well as of use was high.

In the early 90's, there was a shift toward so called roll-about solutions where the technical equipment was packed into one trolley with a TV display unit and a

participant portrayal camera. As transmission path, the DIGINET network known as a prestige of ISDN was selected. The electronics required for packing picture and sound was now packed into one unit, a so called codec. The codec featured the same basic facilities as in the 80's. Special attention was paid to picture and sound quality. With the new techniques, a 384 kB band sufficed to achieve the same picture quality which had previously required a speed of 2 MB.

PC-based solutions began to emerge by the side of the so called studio-standard equipment in the early 90's, and the video conference properties were now packed on 1 to 2 PC interface cards. The first PC hardware generation was designed for personal use. Insufficient technical attention was paid to sound interaction which is essential for group work. Correspondingly, the picture quality did not attain the level of studio systems.

In 1996, a second generation of PC video conference equipment has been launched which pays more attention to both picture quality and sound interaction.

The integration of video conference facilities into computers opens up new possibilities for other applications such as telemedical and new educational applications. As an example, the remote use of MIDI instruments in, for example, teaching, may be cited. Data transmission, the handling of high resolution pictures and patient databases can now be integrated into one system. In the future, medical instruments with an existing computer are likely to be provided with picture transmission connections by the manufacturer.

As regards group conferences, the prior art has mainly been hampered by the high cost of the equipment and the constrained conference situation of traditional video conferences with all participants facing one large screen, this setting resulting in poor eye contact between the participants at the same locality.

The aim of the present invention is to remove the drawbacks of the above-described techniques and the shortcomings of the setting and to achieve completely novel video conference equipment resembling a conventional overhead projector and comprising, among others, the possibility of using the remote music method.

5

The invention is based on using as the conference main camera a document camera which can be pointed vertically at the documents discussed as well as horizontally at the different participants of the conference. In addition, the equipment comprises an extra display unit and a camera for the local conference chairperson. According to the invention, data transmission is in addition to the standard T.120 implemented by means of a so called MIDI interface and for corresponding interfaces.

10

In more detail, the video conference equipment according to the invention is characterized by what is stated in the characterizing part of claim 1.

15

The invention offers considerable benefits.

The new arrangement provides for a natural and unforced conference. The participants can be seated facing the chairperson. Connecting the camera to an overhead projector frame results in easily movable compact equipment. The equipment is also less costly than conventional equipment.

20

The local use of the equipment according to the invention is as easy as using an overhead projector. Connecting remote participants to the conference corresponds to a regular telephone call - the connection is established by selecting the data of the other party from a visual telephone directory where a picture of the other party can be saved along with name information. Due to transmission by means of an integrated person portrayal/document camera and PC interface cards, the participants see each other as well as the conference material either on paper or on transparencies or in file form.

25

30

In the following, the invention is examined in more detail in the light of exemplifying embodiments in accordance with the annexed figures.

Fig. 1 is a schematic side view of an equipment setup according to the invention.

Fig. 2 is a perspective representation of the overhead projector/camera combination according to the invention.

Fig. 3 is a top view of another equipment setup according to the invention.

Fig. 4 shows a user interface according to the invention.

As shown in Fig. 1, the video conference equipment comprises equipment arranged round an overhead projector 1. The overhead projector 1 comprises a document presentation worktop 11. Instead of the overhead projector 1, another suitable camera base such as a conventional document camera base may be used. A camera 2 is attached to the base 1 in connection with the document presentation worktop 11 and can be moved horizontally as well as vertically by means of actuators 3, typically in-built electric motors. A computer 4 functions as a control device for the camera 2 as well as for the rest of the system, the display units 8 and 7 being connected to the computer. The computer 4 is controlled by means of a keyboard, a mouse touch screen or some other known user interface. In addition, the setup comprises a telecommunication module 6 for forwarding the audio and video data. A second display unit 7 and a second camera 9 are reserved for the local chairman of the conference. By means of these auxiliary units 7 and 9 for the chairperson and the camera 2 capable of horizontal and vertical shooting, a normal face-to-face conference seating arrangement can be retained in spite of the video conference situation.

As seen in Fig. 2, outwardly the overhead projector 1 serving as camera base resembles a fully normal overhead projector. The camera unit 2 is mounted at the end of a curved arm 10 above the document presentation worktop 11.

5 As an alternative to the solution of Fig. 2, the camera unit 2 can be mounted on a separate trolley whose upper surface is furnished with a document presentation worktop. Thus, in this embodiment the camera unit is not fixed directly to the document presentation worktop but instead to the frame carrying it. However, what is characteristic of the invention is that the camera 2 is above the document presentation  
10 worktop so as to allow pointing it at the documents.

In accordance with Fig. 3, the video conference equipment may also comprise additional display units 7' for the conference participants. The display units are typically flat, e.g. LCD display units. The various camera focusing possibilities are  
15 indicated by the letters A to E. A represents the target of camera 9 (e.g. the chairperson), B the targets of main camera 2 (view angle for three persons), C an alternative target of the main camera (three persons even here), D the document presentation worktop for main camera 2, and E the whiteboard as a target for camera 2. Each one of the target can at wish be selected by the push-button selectors of an IR  
20 remote control device. The monitor 8 is typically a regular 29 to 40 inch color monitor. In the exemplifying case, the size of the area marked off by the dash line is  $6.5 \times 3.5 \text{ m}^2$ .

As shown in Fig. 4, the user interface according to the invention may also be  
25 implemented by controlling the video image 15 e.g. by means of a cursor. The cursor movement can be performed by means of a mouse or some other control (stick control, touch screen). When under mouse control, the camera is typically turned by moving the mouse into the desired direction and pressing the mouse button. The desired camera position information is saved by taking the relevant video image 15  
30 onto the icons 16. Then it can be clearly seen from the icon 16 itself which participant the camera control information behind each icon relates to. During use, then, the

camera is moved to the desired position by taking the relevant icon 16 onto the video image 15.

5 Saved camera position information can be deleted by taking the icon to the trash can 1.

In the following, typical components suited for use as part of the equipment setup according to the invention are described:

10 A camera base 1 both for shooting pictures of the participants and for presenting documents.

In addition, a multimedia computer 4 with the following features is integrated in the camera base 1:

15 Pentium 133 Mhz, 16 MB RAM, 1.2 GB HDD, CD-ROM, a video display terminal control unit, an ISDN interface and interface cards allowing video conferences, two card slots available in the PC.

Software including an easy-to-use connection to the auxiliaries, as well as display possibilities for various Windows software. The visual database contains:

- 20
- a telephone directory,
  - visually saved presettings for the camera 2, and
  - a document presentation worktop furnished with marking tools.

A camera 9 with an in-built microphone for the chairperson (teacher),  
an extra microphone,  
a keyboard and a mouse,  
25 an IR remote control device,  
1 ISDN (2B+D) interface support and an H.320 compatible video conference codec 6  
with the following features:

- 30
- studio-standard picture quality,
  - a high-class sound system equipped with in-built echo canceling techniques. The echo canceling is automatically calibrated in real time.
  - two microphone supplies,



- two composite video supplies for the cameras and one S video supply for an inbuilt SVGA/PAL converter with an 800\*600 resolution,
- a JPEG still display mode with a video display control device and database connections,
- 5 - ISDN expansible to support three ISDN lines (option). 1 Q97 available.
- expansible for LAN communication (TCP/IP, ATM) (option). 1 Q97 available.
- electronic pen tablet (option),
- a 15" SVGA display with a touch panel (option),
- 10 - a movable trolley (option).

In a video conference between two participants or two groups the connection is established by calling the other party. The call is either automatically answered or, alternatively, the ensuing connection is acknowledged.

15

It is also technically possible to carry out a video conference in a multipoint manner. For this purpose, a special technique termed "bridge" has been devised. The bridge connects most conference parties to each other. During a multipoint session, not all the participants can see each other simultaneously. Picture is usually transmitted only from the party whose speaking turn it is. If the speaking turn is taken over by a participant or participants at a different locality, picture transmission is also relocated either automatically based on sound control, or manually controlled by the conference chairperson. A natural consequence is that only one participant can speak at a time. Those listening should turn off their microphones so as not to cause unnecessary picture switches between the different conference localities caused by noise disturbance (conversation between the participants at one and the same location, rustle of paper, etc.).

25

The multipoint bridges used in connection with the invention are commercially available products. A bridge allows the coupling of as many as 48 localities to one conference session. Furthermore, one bridge can serve several multipoint conferences

30

at the same time. The cost of a bridge allowing four simultaneous connections is about FIM 100,000. Bridge services can also be bought from telecommunication operators.

- 5 In the system of the invention, network interfaces, camera and sound techniques and a visual database application have been combined with a multimedia computer in a novel compact manner. The conference material may comprise paper documents, transparencies, or material displayed by means of a computer.
- 10 The system is controlled by means of a touch screen and/or a separate wireless remote control device. The control measures are clear and visually easy to understand allowing the participants to concentrate on the content of the conference instead of having to control numerous auxiliaries.
- 15 According to a preferred embodiment, the video conference equipment is provided with a MIDI interface and a corresponding telecommunication unit for transmitting data in MIDI form between two or more conference points. This typically requires a parallel port/an adapter unit for a MIDI or an RS232 interface. Thus, the telecommunication module 6 of the video conference equipment allows a data channel
- 20 or TCP/IP communication and the transmission of the MIDI signals of musical instruments as well as of signals controlling the pitch, intensity, duration and manner of presentation of music synchronized with the video picture during a video conference connection. Thus, a person at locality A can play, for example, an acoustic piano equipped with MIDI control such that the video conference equipment
- 25 transmits information on how the piano keys are pressed to one or several localities simultaneously, whereby the piano keys at these localities sound synchronized with the video images as naturally as at locality A. Correspondingly, when the playing takes place at a remote locality, the control information is transmitted to the other localities.

**The invention makes numerous new applications possible for teaching and for transmitting a genuine concert atmosphere in remote form.**

**Claims:****1. Video conference equipment comprising**

- 5                   - a document presentation worktop (11),
- a camera (2) arranged above the document presentation worktop (11),
- actuators (3) such as electric motors for the camera (2),
- 10                  - control means (4) for the actuators (3), for example a computer,
- audio equipment (5) for producing and possibly saving sound,
- 15                  - a telecommunication module (6) for forwarding audio, data, and/or  
video information,
- a display unit (8) for displaying material filmed with the camera (2),
- 20       **characterized in that**
- said camera (2) is of a kind which allows both vertical and horizontal  
shooting,
- 25                  - a personal display unit (7, 7') and camera (9) are reserved for at least  
one conference participant, whereby the conference can be arranged as a  
normal conference as regards the seating of the participants.

2. The equipment according to claim 1, characterized in that the equipment
- 30       comprises a picture database for saving and retrieving conference participant position  
data for focusing and pointing the camera (2).

3. The equipment according to claim 2, characterized in that the equipment comprises icons (16) corresponding to each camera position data item which directly show a picture content corresponding to the position data.

5 4. The equipment according to claim 1, characterized in that the equipment comprises a picture database for saving the telephone data of the participants.

10 5. The equipment according to claim 1, characterized in that the equipment comprises a MIDI interface and corresponding data transmission equipment allowing data transmission in MIDI form during video conferences.

6. The equipment according to claim 1, characterized in that the equipment comprises a parallel port/MIDI interface or an adapter unit for an RS232 interface.

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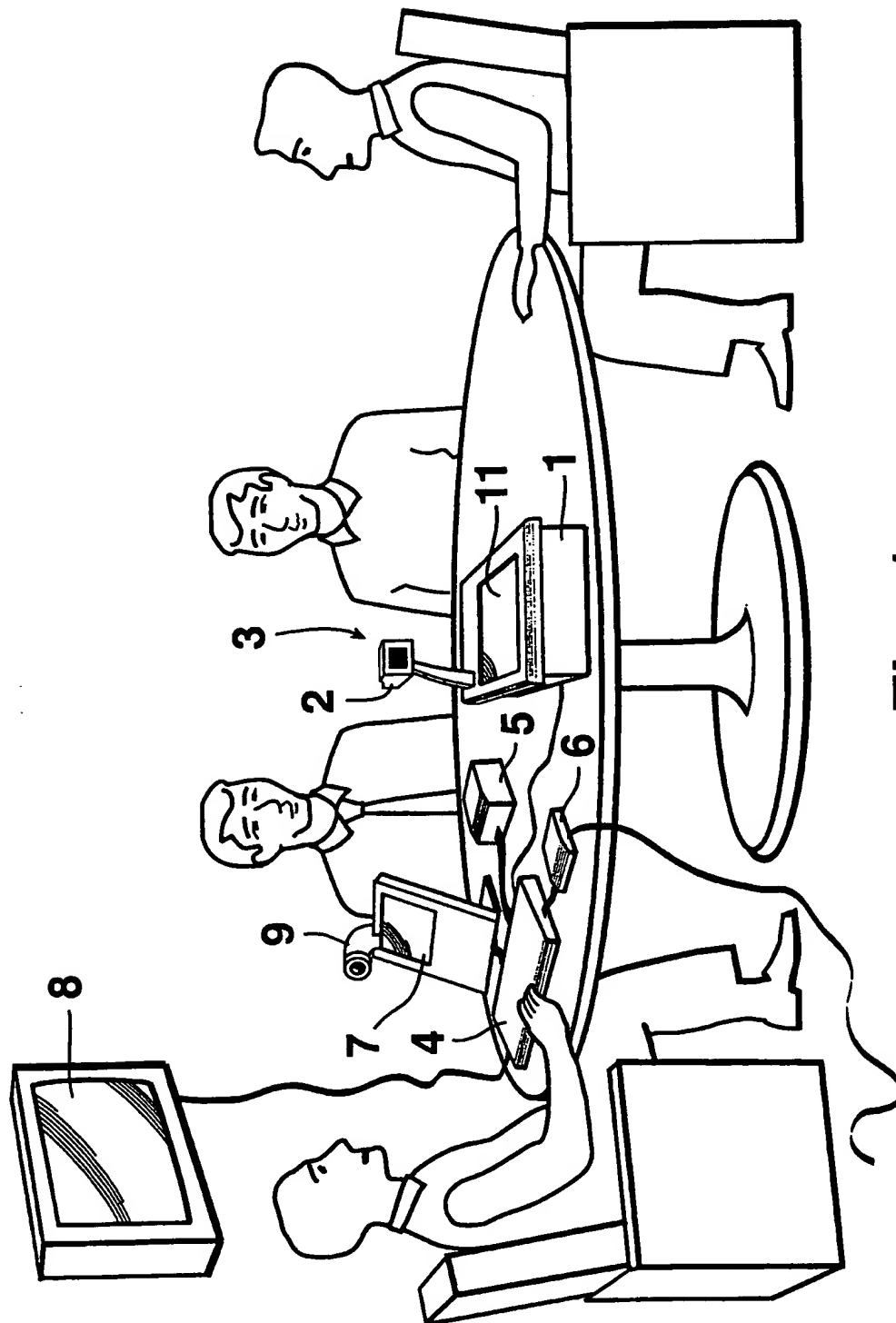
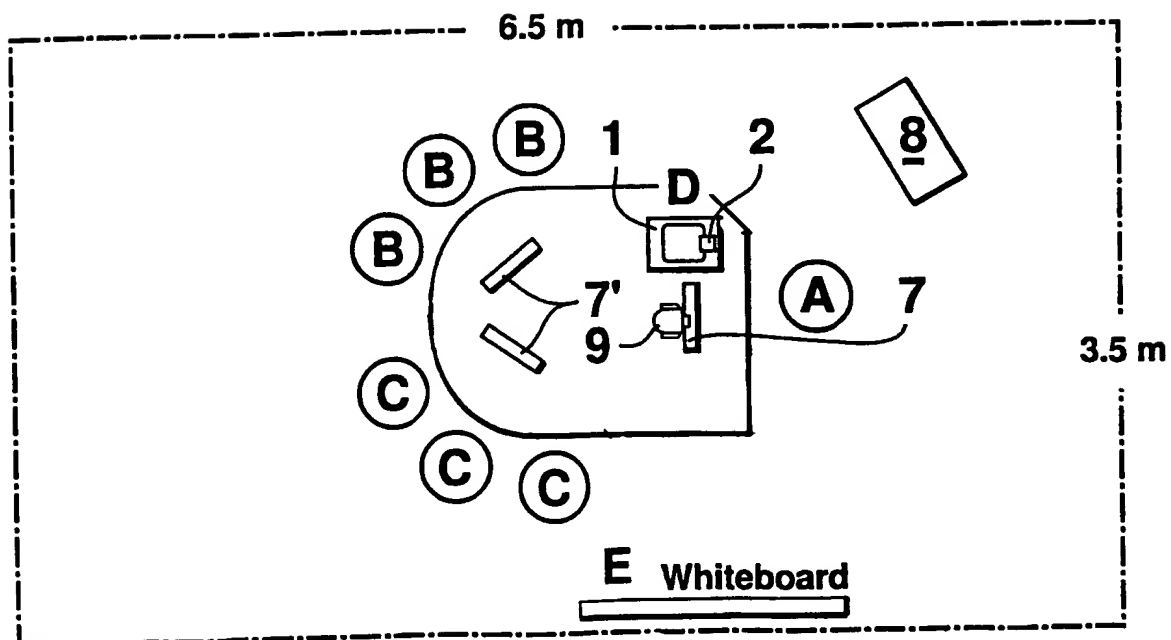
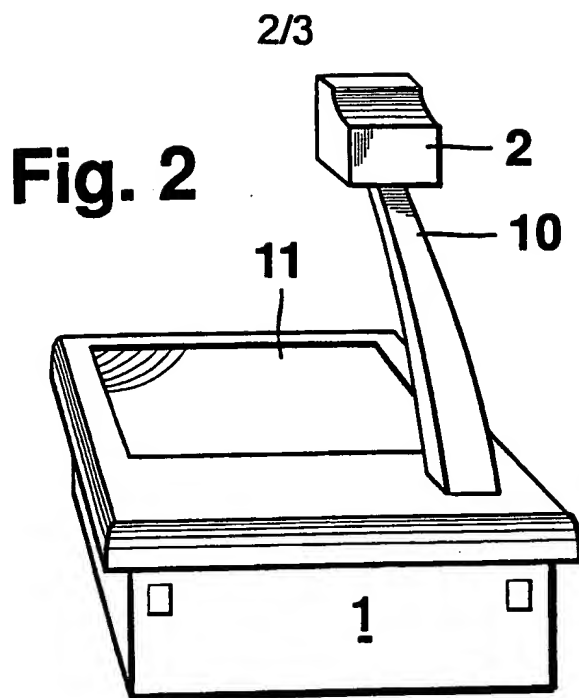


Fig. 1



**Fig. 3**

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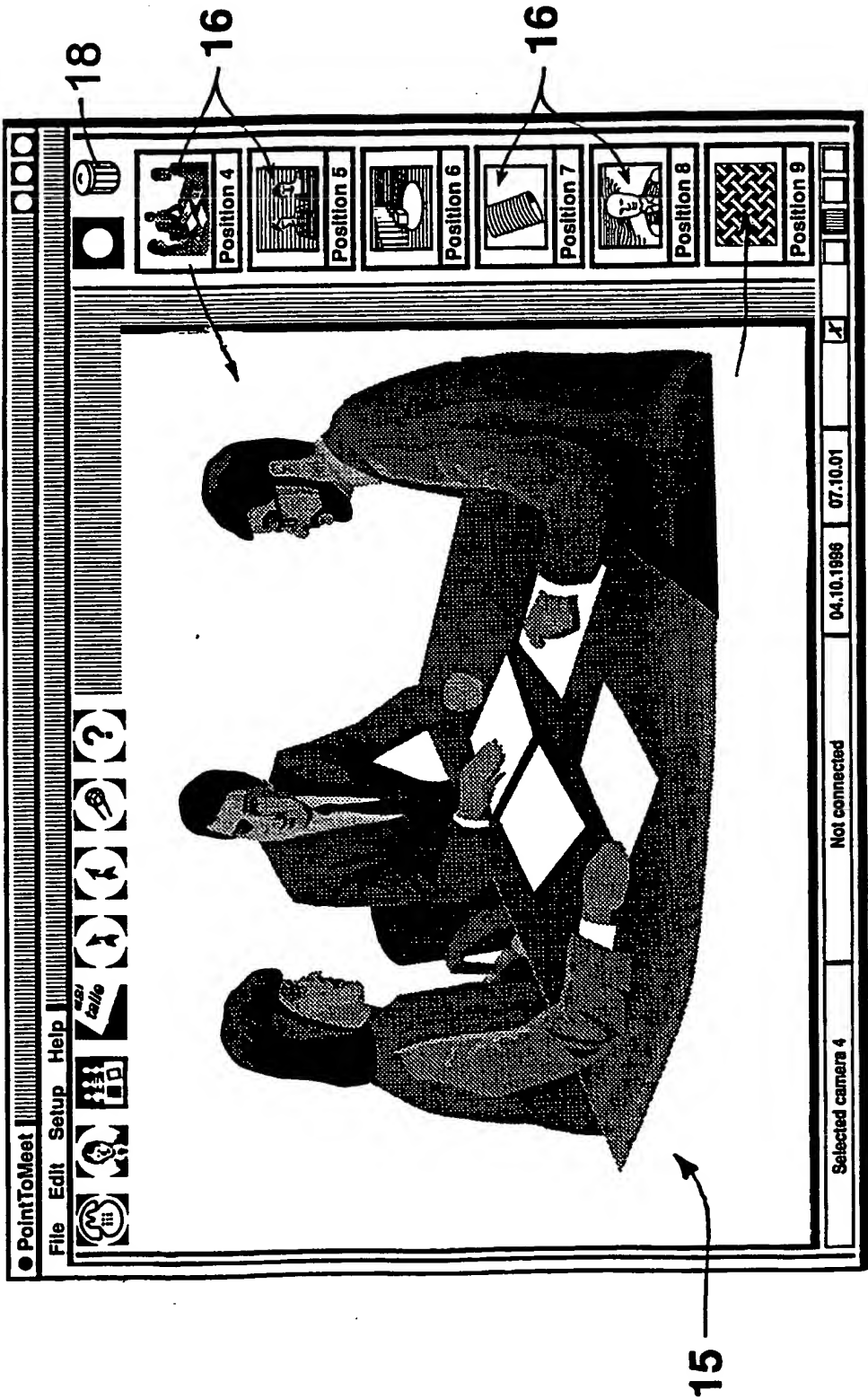


Fig. 4



## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/FI 97/00659

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
IPC6: H04N 7/15 According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols)		
IPC6: H04N		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0539695 A2 (CANON KABUSHIKI KAISHA), 5 May 1993 (05.05.93), column 9, line 52 - column 10, line 10 ---	1-6
A	EP 0717544 A2 (AT&T CORP.), 19 June 1996 (19.06.96), column 7, line 12 - column 8, line 4 ---	2-6
A	US 4758887 A (ENGEL ET AL), 19 July 1988 (19.07.88), figure 8 -----	1-6
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
<p>* Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"B" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p>		
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# INTERNATIONAL SEARCH REPORT

Information on patent family members

02/03/98

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0539695 A2	05/05/93	DE 69221070 D,T	15/01/98
		JP 6030408 A	04/02/94
		US 5636039 A	03/06/97
		JP 6014228 A	21/01/94
		JP 5064046 A	12/03/93
		JP 5075995 A	26/03/93
EP 0717544 A2	19/06/96	CA 2160821 A	17/06/96
		JP 8279808 A	22/10/96
US 4758887 A	19/07/88	CA 1276673 A	20/11/90
		DE 3536044 A,C	16/04/87
		EP 0218963 A,B	22/04/87
		JP 62167506 A	23/07/87